GFC2200DRV

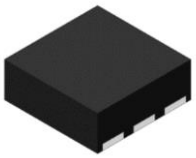
GOOD-ARK Electronics

22V Uni-directional Flat Clamping TVS

Features

- Low clamping voltage at 8/20μs surge curret
- DFN 2020-6
- Low leakage current
- Low capacitance
- IntegratedIEC 61000-4-2 Level 4 ESD protection

RoHS COMPLIANT



DFN2020-6

Applications

- USB Type -C™ Vbus
- Industrial sensor I/O
- Medical equipment
- PLC I/O modules

Maximum Ratings & Electrical Characteristics (T_A=25°C unless otherwise noted)

Parameters	Symbol	Value	Unit
Maximum Peak Pulse Power (W) (8/20 μs)	P_{PPM} (8/20us)	1120	W
Maximum Peak Pulse Current Ipp (A)8/20us	I_{PPM} (8/20us)	60	A
Maximum Forward Peak Pulse Current Ipp (A)8/20uS	I_{PPM} (8/20us)	50	A
Operating junction temperature range	T_J	-40 to 150	°C
Storage temperature range	T_{STG}	-55to 150	°C

Thermal -Mechanical Specifications (T_A=25°C unless otherwise noted)

Parameter	Symbol	Typ	Unit
Thermal Resistance, Junction to Ambient	R_{thJA}	65	°C/W
Thermal Resistance, Junction to Case	R_{thJC}	30	°C/W

Note 1: The thermal resistance from junction to ambient or lemounted on copper pad area of 5.0 x 5.0mm to each termina.

Note 2: The thermal resistance from junction to camounted on recommended copper pad to each terminal.

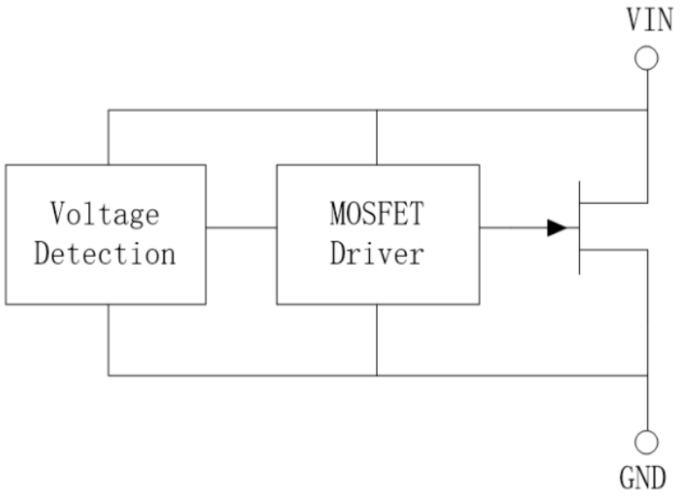
Electrical Specifications (T_J =25°C unless otherwise noted)						
Parameter	**Symbol**	**Test Conditions**	**Min**	**Typ**	**Max**	**Unit**
Reverse Stand-off Voltage	V_{RWM}		-0.5	--	22	V
Leakage Current	I_{LEAK}	Measured at $V_{IN} = V_{RWM}$	--	60	110	nA
Forward Voltage	V_F	I_{IN} = 1 mA from G_{ND} to I_O	0.25	--	0.65	V
Break-down Voltage	V_{BR}	I_{IN}=1 mA from I_O to G_{ND}	24.6	--	27.6	V
Forward Clamp Voltage	V_{CL}	V_{IN} = 5V, I_{OUT} = 200mA	1	2	5	V
Reverse Clamp Voltage	V_{CL}	25A (8/20us) from I_O to G_{ND}, V_{IN} =0 V before surge	--	26	27	V
		35A (8/20us) from I_O to G_{ND}, V_{IN} =0 V before surge	--	27	28	
		45A (8/20us) from I_O to G_{ND}, V_{IN} =0 V before surge	--	28	29	
8/20μs surge dynamic resistance	R_{DYN}	Calculated from VCLAMP at 0.5*Ipp and Ipp surge current levels	--	30	--	mΩ
Input pin capacitance	C_{IN}	$V_{IN} = V_{RWM}$, f= 1 MHz, 30 mVpp,I_O to G_{ND}	--	105	--	pF
Maximum Slew Rate	S_R	0-V_{RWM} rising edge, sweep rise time and measure slew rate when I_{PK} = 1 mA	--	2.5	--	V/μs

Description

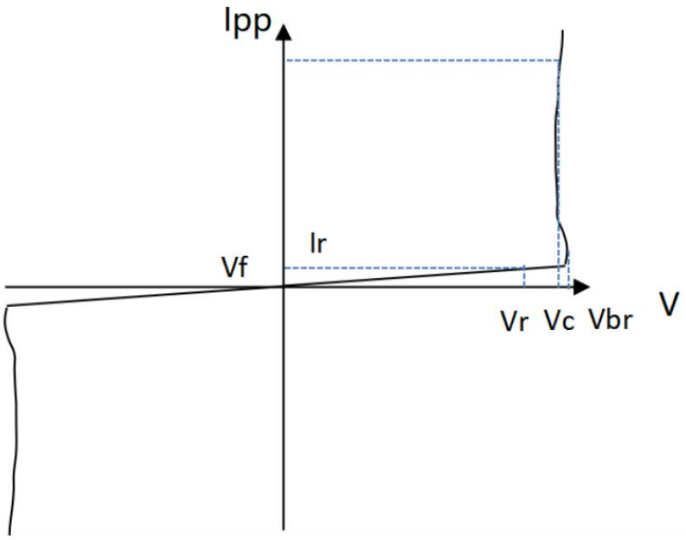
GFC2200DRV reliably diverts fault currents up to 45A, protecting the system against high-power transient surges or lightning strikes. The device provides a solution that meets the EMC requirements commonly imposed on industrial signal lines. GFC2200DRV employs a unique feedback mechanism that ensures precise, flat clamping during a fault condition to ensure the system' s exposure to a max. voltage of 30V. This precise voltage regulation allows designers to confidently select system components with lower voltage tolerances, reducing system cost and complexity without compromising reliability.

GFC2200DRV is supplied in a compact DFN 2020-6 package designed for space-constrained applications. It' s extremely low leakage current and capacitance minimize the impact on the protected line.

Functional Block Diagram



I-V Characteristic Curve



Note 1: VR Stand-off Voltage--Maximum voltage that can be applied to the TVS without operation

Note 2: VBR Breakdown Voltage --Maximum voltage that flows though the TVS at a specified test current

Note 3: VC Clamping Voltage --Peak voltage measured across the TVS at a specified IPPM (peak impulse current)

Note 4: IR Reverse Leakage Current --Current measured at VR

Operation description

Overview

The GFC2200DRV is a precision clamp with a low, flat clamping voltage during transient overvoltage events like surge and protecting the system with zero voltage overshoot.

Feature Description

The GFC2200DRV 's flat clamping feature helps keep the clamping voltage very low to keep the downstream circuits from being stressed. The flat clamping feature can also help end-equipment designers save cost by opening the possibility to use lower cost lower voltage tolerant downstream ICs. TheGFC2200DRV has minimal leakage under the standoff voltage at Vr, making it a good candidate for applications where low leakage and power dissipation is a necessity.

Wide ambient temperature range of –40°C to+125°C makes it a good candidate for most applications.

Compact packages enable it to be used in small devices and save board area.

Protection Specifications

The GFC2200DRV also integrates IEC 6100-4-2 Level 4 ESD Protection.These combine so that the device can be protected against all transient conditions regardless of length or type.

Minimal Derating

Unlike traditional diodes the GFC2200DRV has very little derating of maximum power dissipation and allows for robust performance up to 125°C. Traditional TVS diodes lose up to 50% of their current carrying capability when at high temperatures, so a surge pulse above 85°C ambient can cause failures that are not seen at room temperature. The GFC2200DRV prevents this and allows for the same level of protection regardless of temperature.

During large transient swings, the GFC2200DRV will begin clamping the input signal to protect downstream conditions. While this prevents damage during fault conditions, it can cause leakage when the intended input signal has a fast slew rate. To keep power dissipation low and remove the chance of signal distortion, it is recommended to keep the slew rate of any input signal on the GFC2200DRV below 2.5V/µs at room temperature and below 0.7V/µs at 125°C. Faster slew rates will cause the device to clamp the input signal and draw current through the device for a few microseconds, increasing the rise time of the signal. This will not cause any harm to the system or to the device, however if the fast input voltage swings occur regularly it can cause device overheating.

Application and Implementation

Application Information

A typical operation for the GFC2200DRV would be protecting Vbus input. Without any input protection, if a surge event is caused by lightning, coupling, hot-swap ringing, or any other fault condition this input voltage will rise to hundreds of volts for multiple microseconds, violating the absolute maximum input voltage and harming the device.

Configuration Options

The GFC2200DRV can be used in either unidirectional or bidirectional configuration.The GFC2200DRV shows unidirectional usage to protect an input. By placing two GFC2200DRV 's in series with reverse orientation, bidirectional operation can be used which will allow a working voltage of ±Vr. GFC2200DRV operation in bidirectional will be like unidirectional operation, with a minor increase in breakdown voltage and clamping voltage.

Power Supply Recommendations

The GFC2200DRV is a clamping device so there is no need to power it. Take care not to violate the recommended VIN voltage range (0V to Vr) so that the device functions properly.

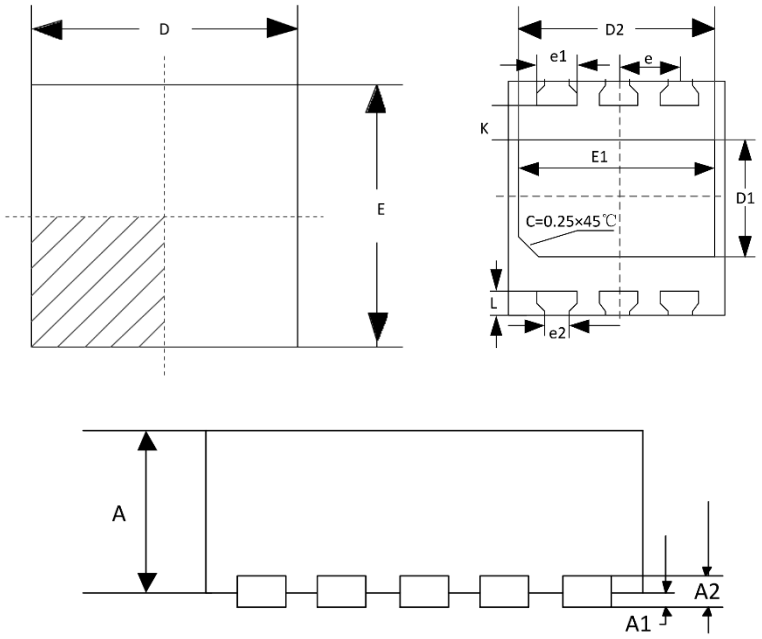
PCB Layout Guidelines

The optimum placement is as close to the connector as possible. EMI during an ESD or surge event can couple from the trace being struck to other nearby unprotected traces, resulting in early system failures. The PCB designer must minimize the possibility of EMI coupling by keeping any unprotected traces away from the protected traces which are between the TVS and the connector.

Route the protected traces as straight as possible. Eliminate any sharp corners on the protected traces between the GFC2200DRV and the connector by using rounded corners with the largest raid possible. Electric fields tend to build up on corners, increasing EMI coupling.

Package Outline Dimensions (Unit: millimeters)

DFN2020-6



SYMBOL	MILLIMETERS		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.025	0.05
A2		0.203REF	
D	1.95	2.00	2.05
D1	0.85	0.90	0.95
E	1.95	2.00	2.05
E1	1.65	1.70	1.75
e		0.65BSC	
e1		0.45BSC	
e2		0.33BSC	
L	0.20	0.25	0.30
K		0.3BSC	

Revision History

Version	Date	Description of changes
Rev.A	2026.11.05	Official Relea

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